

A GENERAL ECOLOGICAL MODEL FOR INTERPRETING FOREST LANDSCAPE PATTERNS AND PROCESSES IN THE CENTRAL HARDWOOD FOREST REGION

James S. Fralish[†]

Based on previous research on forest communities in Illinois, Kentucky and Tennessee, a general ecological model has been developed for interpreting forest community patterns and processes across the landscape. Past ecological and physiological research that has shown three major environmental resource factors control the primary response of most terrestrial (upland and wetland) woody plant species. These resources are 1) light or lack of it, 2) soil water (too little, too much, optimum) and 3) soil oxygen or a lack of it. The assumption here is that the forest plant is within its normal geographic range and is free to interact with its normal associates. A fourth factor, disturbance, has a major effect on species distribution through damage to the photosynthetic component and forest structure which effectively rearranges the distribution of the resources or changes their amount or level of intensity. The general ecological model for the central hardwood forest region is a construct that combines species distribution (normal or Gaussian) curves (continuous) with a soil moisture/oxygen gradient from xeric to mesic to hydric. The model integrates the ecological/physiological characteristics responsible for species response to variations in environmental resources. Disturbance, or lack of it, may be responsible for major changes in the landscape patterns, and the landscape model has been modified to reflect this effect. The submodel integrate and show the consistency in patterns of species characteristics such as functional and realized niches, shade tolerance, stem size, growth rates, *r* and *k* reproductive strategies as well as a third strategy type, seed size, and type of seed dispersal. Stand composition, basal area and diversity also show consistent patterns. The effect of disturbance on stand and species characteristics (e.g., species richness) changes with location along the gradient.

[†]James S. Fralish Departments of Forestry and Plant Biology Southern Illinois University Carbondale, IL 62901-4411 Phone 618-549-4172 FAX 618-549-6318 Email: jfralish@gte.net